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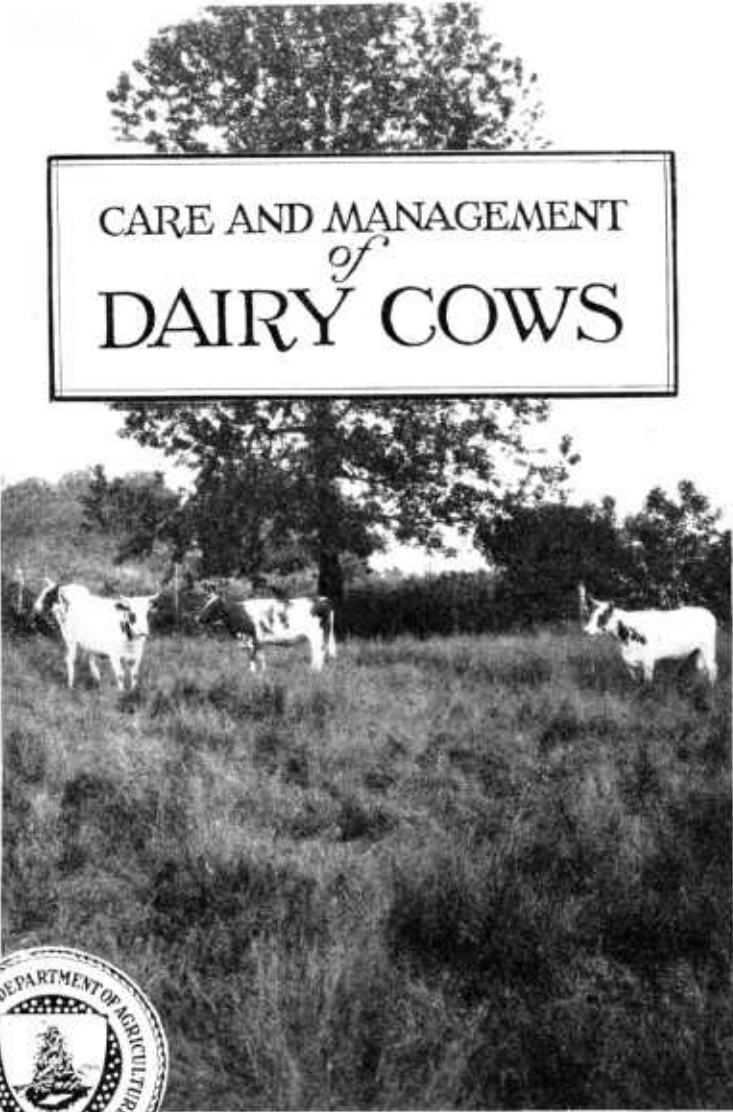
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FARMERS' BULLETIN No. 1470 *rev. July 1938*

CARE AND MANAGEMENT
of
DAIRY COWS



THE MOST successful dairymen keep good cows only, feed them well, and manage them properly. Their cows are housed in stables conveniently arranged for dairy work, dry and well ventilated, and easily kept clean. Because profitable cows must be comfortable cows, all dairy operations must be planned with due regard to their comfort.

The constantly increasing demand for high quality in dairy products calls for more and more attention to cleanliness and sanitation on the dairy farm. For this reason, as well as to avoid losses, diseases among the cows must be guarded against.

Efficient management requires that breeding and production records be kept. Careful and continuous attention must be given to various details in order that expenses may be kept down.

This bulletin describes certain practices in the care and management of dairy cows which practical experience as well as scientific investigations have shown to be successful.

CARE AND MANAGEMENT OF DAIRY COWS

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SUCCESS IN DAIRYING depends largely upon the proper care and the efficient management of the herd. Unless the dairy farmer is thoroughly acquainted with approved practices he is likely to make many costly mistakes. The purpose of this bulletin is to present important facts, pertaining to the care and management of dairy cows and to describe briefly the practices which experience has shown to be good.

CARING FOR THE DRY COW

It is generally considered that a cow should be dry for a time before calving, for four principal reasons: (1) To rest the organs of milk secretion; (2) to permit the nutrients in the feed to be used in developing the fetus instead of in producing milk; (3) to enable the cow to replenish in her body the stores of minerals which may have become depleted through milk production; and (4) to permit her to build up a reserve of body flesh before calving. Practical experience has shown that cows denied a dry period will give less milk the following lactation than those allowed a period of rest.

¹ Resigned May 31, 1937.

DRYING OFF

Until a few years ago, drying off a persistent producer was accomplished with some difficulty because it was thought necessary to treat and feed the cow so that she would be producing not more than a few pounds of milk when milking was stopped entirely. Now we know that cows giving as much as 20 pounds a day will not be injured if milking is discontinued abruptly. Possibly cows producing more than 20 pounds a day can be dried off safely in the same way, but it does not appear best to discontinue milking such cows abruptly. The production can be readily reduced to 20 pounds or less by withholding some of the feed. With cows giving considerable quantities of milk, the udder becomes distended, and further secretion is checked when milking is discontinued. The milk in the udder will be reabsorbed gradually. While this is taking place some of the milk will become stringy or lumpy, resembling that produced in some cases of mastitis. One should not be alarmed upon finding such milk as it appears to be a natural occurrence with cows being dried off by this method.

LENGTH OF DRY PERIOD

The length of the dry period required depends on the quantity of milk the cow has been producing and on her condition or fleshiness. The greater her production has been the more likely that her body has been depleted of the nutrients used in milk secretion and the longer the dry period required to replenish the losses and to store adequate reserves for the next lactation. Cows should always be in at least a medium state of flesh at time of calving. For this reason, thin cows should have longer dry periods than those carrying more flesh. Some investigations in England show that the longer the dry period, up to 120 days at least, the greater the yield of milk in the subsequent lactation; however, these progressive increases in yield become less pronounced as the length of the dry period increases. The cost of keeping a cow in a dry condition for a very long period will more than offset the value of the increase in yield. For cows that are well fed and are in good condition at time of drying off, it is suggested that the dry period should be 30 to 60 days, the shorter period being for low producers. Thin cows should be dry for longer periods.

CONDITION OF THE COW AT CALVING TIME

Cows normally lose weight for 3 to 6 weeks after calving, because they cannot consume enough feed to provide adequately for both the milk flow and the maintenance of body weight. Therefore, in order that they may not become too thin after calving, it is necessary that they carry considerable flesh at calving time. Cows in good condition at calving time will start the lactation period at a higher level of production than will thin cows; this results in a larger yield of milk for the year. Cows need a reserve of body tissues on which to draw until they recover from the effects of calving. There is no economy in having cows thin at calving time. The value of the additional milk yielded by cows in good condition will more than offset the cost of the feed required to put them in good condition.

On the other hand it appears that cows should not be extremely fat at calving time. Very fat cows are likely to have poor appetites after calving and are often troubled with excessive congestion of the

udder. The feeder should, to a large extent, be guided by the condition of the cow's udder. If the udder becomes badly swollen, the cow's grain allowance should be reduced.

An investigation at the Bureau of Dairy Industry farm at Beltsville, Md., showed that liberal feeding (12 pounds of grain a day), as compared with moderate feeding (4 pounds of grain a day), for 2 months before calving failed to change the condition of the cow materially or to increase the quantity of milk produced after calving. Therefore it seems that cows should be so fed during the lactation period that they will be in good flesh when they are dried off. Apparently it is the condition of the cow that counts rather than the level at which she is fed before calving.

The feed during the dry period should contain plenty of protein and minerals, especially calcium (lime) and phosphorus. Legumes, either as pasture or hay, furnish protein and lime; wheat bran, cottonseed meal, and linseed meal are good sources of both phosphorus and protein. Green grass or other green forage promotes the assimilation of calcium. A dry cow on good pasture will get all the nutrients she requires. However, if it is suspected that the ration fed during the lactation period lacked minerals, steamed bonemeal and salt may be mixed in the proportions of 2 to 4 parts of bonemeal to 1 part of salt and put where the cow can get all she wants of the mixture. In the winter, legume hay of good quality and a grain mixture containing wheat bran, cottonseed meal, or linseed meal will supply the needed minerals. The feeds already mentioned as being high in lime and phosphorus are high in protein also.

CARING FOR THE FRESH COW

AT CALVING TIME

In handling cows that are heavy with calf, care should be taken to prevent them from being injured by slipping on stable floors or on ice, by crowding through doorways, or by mounting cows that may be in heat. Confine all cows that are in heat, or at least separate them from the cows that are heavy with calf. In other particulars, the pregnant cow may be handled like the rest of the herd.

A week or two before the cow is due to calve, keep her under close observation, as she may need special attention when calving. If she has been on pasture, she may be kept there; but her condition should be observed at least twice a day. If she is to calve in winter, place her in a clean, roomy, well-bedded box stall. Sometimes the udder becomes so large and swollen that it is desirable to draw out some of the milk before she calves; this, however, is seldom necessary and should be avoided if possible, because it stimulates further secretion and because the first milk (colostrum) is beneficial to the calf. Keep the cow as quiet as possible; dogs and small children are likely to excite her at this time. Feed her a laxative ration; wheat bran and linseed meal are especially good.

Immediately after the cow has calved, give her warm water to drink if the weather is cold. If the cow becomes chilled at this time, the afterbirth may not be passed so readily, and she may be predisposed to other ailments. It is also best not to draw all the milk from the udder for a day or two after the calving. Leaving some of this milk may help to prevent milk fever.

After a couple of days, under normal conditions, the cow may be placed in the stable with the milking herd. The calf may be removed from her at once or at any time thereafter, but in any event it should receive the colostrum milk until the milk is fit for human use. The sooner the calf is taken away the less the cow will fret over its loss, although the calf may thrive better if left with its mother for 12 hours to 2 or 3 days, especially if it is weak or may suffer from the cold.

Give the cow as much roughage as she will eat, provided she is accustomed to a liberal allowance of roughage, but feed concentrates sparingly at first and then increase gradually. Take at least 3 weeks to get the cow up to full feed. Too much concentrated feed at this time is likely to cause digestive disturbances and to hinder the reduction of swelling in the udder. In general, it is better to err in not giving sufficient concentrates than in giving too much. The quantity to be given just after calving is usually 4 to 8 pounds a day, depending upon the size of the cow, her production, and the quantity she was accustomed to before calving.

SEASON OF YEAR FOR FRESHENING

Table 1 is based on a study made by the Bureau of more than 120,000 cows in herds belonging to members of dairy herd-improvement associations and shows the relative production by cows that freshened in different seasons.

TABLE 1.—*Season of freshening, with average yearly records of production*

Season of freshening	Cows	Average production	
		Milk	Butterfat
	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>
Spring (March-May).....	29,615	7,792	313
Summer (June-August).....	24,614	7,618	306
Fall (September-November).....	34,973	8,238	330
Winter (December-February).....	31,520	7,990	325
Total or average.....	120,722	7,934	318

The cows that freshened in the fall ranked highest in average yearly production of milk and butterfat; the cows that freshened in the winter ranked second in average production of milk and butterfat. The cows that freshened in the summer ranked lowest in average yearly production.

The income over cost of feed was slightly greater for the cows freshening in the fall and winter than for those freshening in the spring and summer. The difference, however, would not justify holding cows over in a dry state from one season to another in order to have them calve at the most favorable season. Perhaps in some localities the conditions as regards markets and feeds will vary enough from the averages as given to make holding cows over from one season to another profitable. The problem must be worked out by each farmer. The biggest difference will come in the seasonal prices of milk and feed rather than in the quantity of milk produced.

Cows that calve in the spring usually give a big flow of milk early in the summer, when butterfat is usually low in price. They are

very likely to suffer a severe setback in milk production later in the summer because of heat, flies, and short pasture. It is difficult to get them back to high production in the fall and winter; consequently, they must be carried through the winter on expensive feeds with a very small margin of profit.

There are several advantages in having cows freshen in the fall. Butterfat usually brings a higher price then and in the winter. Labor is easier to obtain, and there is more time to care for the calves and for a large supply of milk. Fall-dropped calves are easier to raise and usually are less subject to disease. The fall-freshening cows, if properly fed and handled, as a rule produce well in winter and fall off as spring opens. At this time, however, the spring-pasture grass acts as a stimulus and causes increased production in spring and early summer. Their period of lowest production is



FIGURE 1.—Weighing out feed from a truck.

July and August, when conditions are likely to be unfavorable for high production.

However, in localities where the pasture season is long and grass abundant, it may be more economical to have cows freshen in the spring and produce most of their milk on pasture.

The dairyman who sells his milk to a city retail trade should have some cows freshening at all seasons of the year in order to keep up a steady flow of milk. This matter is not so important for dairymen who separate the milk, sell the cream, and use the skim milk for feeding.

METHOD AND ORDER OF FEEDING

The quantity of grain to be fed to each cow should be carefully determined. A number of methods for feeding the grain are in use, but the most practical is to place a general herd mixture in a truck or cart that is pushed through the feeding alley and to weigh or measure the quantity for each animal (fig. 1). Some cows may need certain

feeds that are not included in the herd mixture, but these cows can easily be fed later. A feeding card or sheet showing the quantity of feed each cow is to get should be used. A small blackboard can be attached to the feed cart and the figures placed on this board or these figures can be placed on a card or blackboard in front of or above the cow. A spring-balance scale suspended on an arm above the cart will be of great help.

Silage can be fed from the same or a similar cart. If an occasional scoopful of silage is weighed as a check, the quantity which is being fed can be measured with a fair degree of accuracy by counting the scoopfuls.

If loose hay is fed, the hay chutes should be conveniently placed so that the feeding requires as little work as possible. Occasional weights of hay should be taken in order to feed cows economically and efficiently.



FIGURE 2.—Salt box with roof to keep out the rain.

Feed cows regularly, because they are probably more sensitive to change in the feeding routine than to variation in the hours of milking. Grain is usually fed before milking and the roughage afterward. This practice tends to avoid dust in the stable air during milking. Silage and other feeds that might taint the milk should be fed after milking. Feed about half the grain and roughage in the morning and half in the evening. If cows are milked oftener than twice a day, the grain feedings

may correspond, but the roughage can still be fed twice a day.²

SALTING

Dairy cows should have all the salt they want. The demand for salt will vary with the size of the cow and the quantity of milk she is giving. Experiments have shown that a cow needs 0.75 ounce of salt a day for 1,000 pounds live weight and 0.3 ounce for each 10 pounds of milk produced. The common practice is to mix salt with the grain at the rate of 1 pound of salt to 100 pounds of grain. Assuming that the grain is fed in proportion to the milk produced, it appears that the higher-producing cows will receive enough salt in the grain mixture but that the lower-producing cows may not get as much as they need. Cows should be allowed access to salt at will at least once a day in addition to what they get in their grain. Rock

² Detailed information on feeding is given in Farmers' Bulletin 1626, Feeding Dairy Cows.

salt can be placed at convenient places in the pastures or yards, or if granular salt is used it should be put in a covered box so that it will be sheltered from the rain (fig. 2).

In some regions where the forage grown is deficient in phosphorus or calcium, and in other places where feeds naturally low in content of phosphorus or calcium are used, it is desirable to allow cows free access to steamed bonemeal in a covered box similar to that suggested for salt. Bonemeal steamed enough to destroy any organisms of disease but not enough to remove most of the organic matter from the bone is better for feeding in this way than the specially steamed bonemeal, because of its greater palatability. Mix it with salt in the proportion of 2 to 4 parts of bonemeal to 1 part of salt.

WATERING

A plentiful supply of fresh, clean water is essential on the dairy farm (fig. 3). The dairy cow's demand for water depends mainly upon the air temperature, the quantity of milk produced, and the



FIGURE 3.—A practical concrete watering tank, accessible from three lots.

amount of succulent feed in the ration. The quantity of water drunk in cold weather is about the same as that drunk in moderate weather but much smaller than that drunk in hot weather. If large quantities of such feeds as beets or mangels are fed, very little water is required.

In experiments at the dairy experiment station at Beltsville, cows were watered once a day, twice a day, and at will from watering cups. When they were watered once a day, they drank less water and produced less milk than when watered twice a day or at will. When they were watered twice a day, they drank as much but produced less than when they were watered at will. The cows used were average producers. The greatest difference in production was between the cows watered once a day and those having water at will. This amounted to only about 5 percent. The higher the production, the greater the benefit from frequent watering. Some low-producing cows fed silage, hay, and grain refused to drink more than once a

day in cold weather. Cows producing similarly and receiving the same kind of feed drank 80 percent more water in summer than in winter. The demand for water was greatest after eating hay. In cold weather cows prefer water that has been warmed and will drink more of it, though experiments at several stations show that the amount of milk produced is influenced but little by warming the drinking water.

In cold climates when the outside supply of water is likely to be frozen, the easiest way to water cows is through the use of watering bowls in the barn. In milder climates, where the cows are not stabled so constantly, one may more readily forego the use of watering bowls. If watering is to be done twice a day, the best times are immediately after the cows have had a chance to eat most or all of their dry feed.

MILKING

REGULARITY

Of all the operations having to do with the production of milk, the act of milking takes the most time and to many persons is the most irksome. Doubtless this feeling has come about partly because of the common belief that cows should always be milked not only at the same hours each day but also by the same person for the most satisfactory results.

While such an arrangement would be ideal, experiments have shown that average to good cows may be milked at rather irregular hours without any marked effect upon the production provided the other operations, particularly feeding, were carried on in a regular manner. When irregular milking was accompanied by irregular feeding, the production was lessened by about 5 percent. To what extent very high producers and very low producers would be affected has not been determined. It is not to be concluded from this that regularity in doing the dairy work is of little importance, but rather that occasional deviations may be safely made from a set schedule when other work is pressing.

In spite of the rather general belief that a cow will produce more milk if always milked by the same person, the practice in many of the larger dairies is to milk the cows as they come rather than to have each person always milk the same cows. This serves to equalize the work, and if the cows are acquainted with all the milkers they will probably give as much or nearly as much milk as if they were always milked by the same person. Some milkers are naturally more efficient than others. Changing from a good to a poor milker will result in less milk; changing from a poor to a good milker will result in more milk, provided strangeness is not a disturbing factor.

FREQUENCY

Between one milking and the next the udder gradually fills with milk. The "giving down" of the milk is mostly caused by releasing the milk into the milk cisterns and teats, where it can be drawn, rather than by actual secretion at the time. As the udder becomes distended with milk, secretion is less active and the greater the distention the more pronounced is the check upon secretion. This is the principal if not the only explanation for the increase in production obtained by more frequent milking.

The increase to be expected by milking cows three times a day instead of twice will vary from about 10 percent for short periods of a month or so to 20 percent or more for whole lactations. Cows milked three times a day produce more persistently. The percentage of butterfat in the milk is not affected. It is believed that one can safely estimate an increase of 20 percent by milking three times a day instead of twice, and 35 percent by milking four times instead of twice if the more frequent milking is done for the entire lactation period and if enough feed is provided for the extra milk produced. Whether it will pay to milk cows three or four times a day instead of twice must be determined by the individual dairyman. The profit depends upon the quantity of production, the length of time the extra milking is to be practiced, the cost of doing the extra milking, the cost of extra grain that must be fed, and the value of the product. For each extra pound of milk produced, one must allow 0.4 to 0.6 pound of grain, depending upon the richness of the milk. In general, it appears that high-producing cows whose product is disposed of at good prices can be milked profitably three times a day, especially if a milking machine is used. On the other hand, with low- or medium-producing cows whose product is used for making butter, cheese, or condensed milk, it would not be profitable to milk more than twice a day.

INTERVALS BETWEEN MILKINGS

When the intervals between milkings are unequal, the larger quantity of milk and the lower percentage of fat in the milk tends to follow the longer interval. However, if the longer or shorter interval is continued successively, the percentage of fat in the milk is not changed from the percentage which is normal for the cow. For example, if the hours of milking are 6 in the morning and 4 in the afternoon, the afternoon milking will be smaller in quantity but richer in fat than the morning milking. However, any interval, whether short or long, if practiced continuously fails to affect the normal percentage of butterfat. A cow may be milked twice a day or four times a day without raising or lowering the percentage of fat in the milk. The percentage of fat in the milk is a fixed characteristic and can be changed only temporarily by varying the hours of milking. Any fat that is left at one milking will be recovered at the next or subsequent milkings. An exception to the above statements may be made: It has been found by some investigators that if the night and day intervals of milking are equal, the morning's milk will be slightly greater in quantity and slightly lower in percentage of fat than the evening's milk. Exercise has been found to increase slightly the percentage of fat in the milk. Possibly the fact that cows are more active during the day will explain why evening's milk contains a slightly higher percentage of fat than morning's milk.

MILKING BY HAND

The requirements of good hand milking are to draw the milk quickly and without discomfort to the cows, to keep the milk clean, and to get all the milk. Milking requires considerable skill, and some persons never learn to be good milkers. The most successful milkers use the whole hand rather than the thumb and index finger; they milk rapidly and continuously; they milk with dry hands;

they avoid strong downward pulling and jerking on the teats, as well as grasping and bruising the udder. Loud, boisterous talking tends to excite the cow, but so far as known, singing or whistling is not objectionable. Rough treatment and shouting at the cow while milking or at any other time is not conducive to the most liberal yields of milk.

Wet-hand milking is insanitary and in cold weather the teats of cows milked wet are more likely to chap. The order in which the quarters are milked seems to make no difference in the total production. One may follow whatever order appears to be the most convenient. If some of the teats are too small to grasp with the whole hand, it may be easier to milk such teats first than to milk them last when the lower part of the udder is distended with milk.

In general, 6 to 10 cows can be milked by a person in an hour, depending on how hard the cows are to milk, the quantity they are giving, and how far the milk must be carried. Ordinarily, eight cows an hour would be classed as good hand milking.

The intent should be to get all the milk if it can be done without taking too much time. As the secretion of milk is a continuous process, it is almost impossible to get the "last drop." Furthermore, to try to do so is not worth the time it takes. Some milk is always left in the udder, and investigations have shown that leaving a pound or so does not harm the udder or cause the cows to dry off rapidly. The last milk secreted is richest in butterfat. A single incomplete milking will have a lower percentage of butterfat than complete milkings before and after, but if incomplete milking is continued the percentage of butterfat in the milk will be the same for incomplete milking as for complete milking. It has been estimated that about half of the milk left in the udder is recovered at subsequent milkings. Stripping should not be continued for so long that the value of one-half the milk obtained by stripping fails to cover the value of the time spent in doing the stripping.

MILKING BY MACHINE

The milking machine has proved to be practicable on a great number of dairy farms. Its principal advantage is the saving in labor. A herd of cows can be milked by machine in from one-third to one-half the time required to milk them by hand. The machine also protects the milk better from contamination by the milker and by dirt falling off the udder and flanks of the cow. Therefore, if all parts of the machine with which milk comes in contact are carefully cleaned and treated to kill bacteria, the milk drawn by machine should be cleaner than that drawn by hand. The yield by machine milking for the lactation period is as great as would be obtained by medium to good hand milkers, but is not as great as would be obtained by the best hand milkers. Cows milked by machine often lack the persistency of those milked by hand.

In some herds the milking machine has been used for many years without apparent damage to the udders of the cows; in other herds where the machine has been carelessly or improperly used there is evidence that it may contribute to the occurrence of mastitis. The method of operating the machine for the best results has not been definitely determined, but there seems to be a fairly universal agree-

ment on two points—one is that the teat cups should not remain attached after the milk ceases to flow, and the other is that an excessive vacuum should be avoided.

Each milker usually operates from two to four units, the number depending on whether he or some other person strips the cows and on whether manipulation or hand stripping is practiced to get the last of the milk. The maximum number that can be milked per unit per hour is 10 cows. One man with 2 units can milk and strip by hand as many as 20 cows an hour. One man with 3 units can milk 25 cows an hour if manipulation of the udder is practiced in lieu of hand stripping. One man with 4 units can milk 40 cows an hour if some other person does the stripping. Additional time must be allowed for getting the milk to the cooling room. This may amount to very little if the practice is to pour the milk into cans in the barn and then carry the milk to a nearby cooling room, but it may amount to considerable if the practice is to take each cow's milk directly to the cooling room. Rapid milking is preferable to slow milking not only because of the saving in time, but because of the possibility that long-continued suction on the teats may be harmful; also, many dairymen believe that slow milking may cause cows to develop the habit of giving down their milk slowly.

Manipulating the udder to complete the milking process, instead of stripping by hand, consists in pulling down on the claw of the teat cups while gently squeezing and massaging the lower part of the udder. This requires from only a few seconds to a minute or more, depending on the individual differences in the cows and on the completeness of milking. If an attempt is made to get all the milk, the saving in time over hand stripping is slight. Manipulation lessens the possibility of contamination by the milker and by dirt from the cow; also, the milk from the cow is all drawn into one container so that the weights are recorded more conveniently than if the strip-pings are handled separately from the rest of the milk. Manipulation may prove unsatisfactory for inexperienced machine operators, particularly with the bucket-type machines because of the inability to judge when the milking is properly completed. Unless there are serious objections to hand stripping on sanitary grounds, it is generally considered more satisfactory with the bucket-type machines to strip by hand than to practice manipulation.

In recent years a method of machine milking has come into use in certain dairies making a specialty of clean milk. The cows are taken to a separate room for milking, usually being stopped en route to have their udders washed and dried. This separate room is commonly called a "milking parlor." The milk is drawn by machine into glass pails suspended on spring scales, and from these pails it is drawn by vacuum into an adjoining room for collection in cans or for cooling. As soon as a cow is milked she is released and another takes her place. One man handles two to four units, and manipulation instead of hand stripping is usually practiced.

HOUSING DAIRY COWS

The main requirements in housing dairy cattle in the winter are to keep them dry and out of the wind and drafts and to provide plenty of fresh air and sunlight. The temperature of the dairy barn, if it

is of the closed type, should not fall below freezing; but if the cows are kept in an open barn or shed where they may move about at will they will suffer no ill effects from somewhat lower temperatures. In the severe winter weather of North Dakota, cows have been found to thrive in open sheds where little protection was afforded against the low temperatures but where they were kept dry and out of the wind. The coats of hair on the cows become long or short as required to keep them warm or cool. For this reason sudden changing from a warm barn to a cold one should be avoided. Certain investigations have indicated that the optimum temperature for well-fed dairy cows kept in a barn free from drafts is 50° to 55° F. Rather wide variations from the optimum are possible without any noticeable adverse effect.

Over most of the United States the summer temperatures appear to be more trying than the winter temperatures. Average temperatures exceeding 85° F. for more than 48 hours were found at the California Agricultural Experiment Station to increase the body temperatures and to lower the production of milk. In case cows are to be housed in the summer, provision should be made to get the full benefit of all cooling breezes. The windows can be made low and the sash removed in hot weather, or with some types of barns the sides can be removed or swung up to permit unrestricted air circulation.

TYPES OF BARNS*

Various types of barns are successfully used to house dairy cattle. The most common type of barn in the northern part of the United States is one in which the hay is stored in the loft above the cows (fig. 4). This construction usually puts the feed in a more convenient

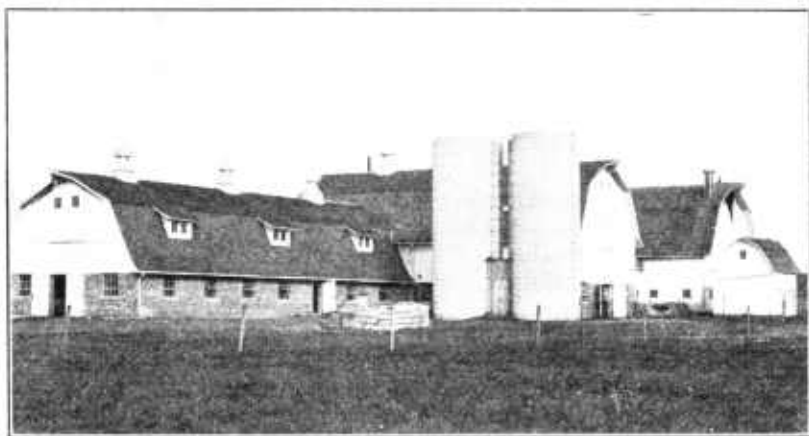


FIGURE 4.—A group of two-story barns. Note the ample space for hay storage.

position than if the cows and feed are under separate roofs. In the southern part of the United States where the need for hay storage is less pronounced the one-story barn (fig. 5) is more widely used than

*For information on barn construction see Farmers' Bulletin 1342, Dairy Barn Construction.

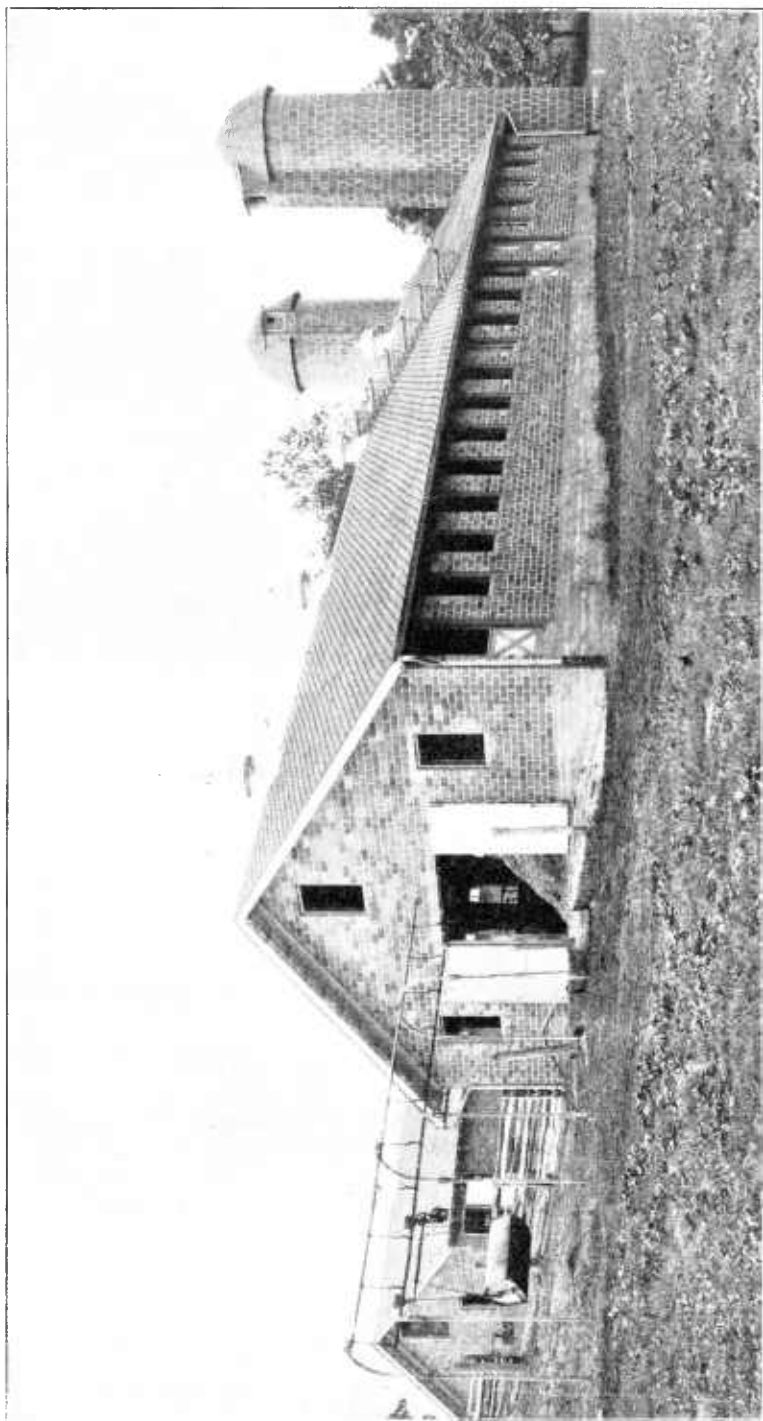


FIGURE 5.—A one-story cow stable with silos.

it is in the North. The open type of barn or shed (figs. 6 and 7), where the cows run loose either together or separated into groups, is being used to some extent in all parts of the United States, but it is better adapted to those regions where bedding is cheap and plentiful and where an abundance of hay is grown and fed than to those where such materials are less plentiful. The better saving of fertilizing constituents of the manure in the open shed may partly or completely offset the increased cost of the bedding required.

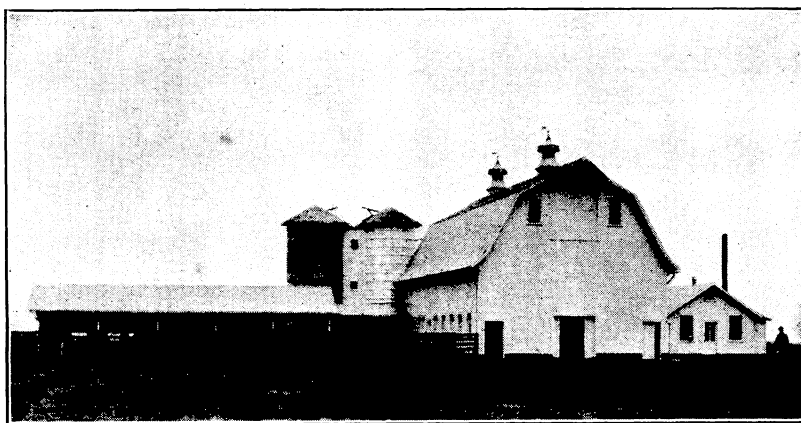


FIGURE 6.—An open shed adjoining a two-story barn.

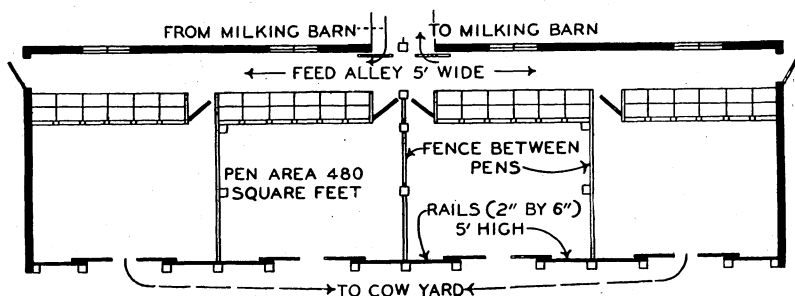


FIGURE 7.—Plan of an open barn (30 by 98 feet) with pens for separate groups of cows and stanchions and mangers for individual feeding.

The ordinary type of dairy barn in which the cows are kept in individual stalls has the advantage over the open type of barn in that each cow can be fed individually, less bedding is required, the cows are conveniently placed for milking and showing, and the more-timid cows are protected from the "boss" cows.

The open barn or shed is advantageous in that it provides the best known method of saving the fertilizing constituents of the manure; it permits the feeding of rough materials, such as corn stover, under shelter; and makes possible the use of the uneaten portions for bedding. The manure does not have to be removed each day, and if the feeding racks are large enough, a supply of hay sufficient to last for several days may be put in them at one

time. The open barn is not likely to make any less total work, but it will lessen slightly the work that must be done regularly every day. All cows kept in the open barn must be dehorned, and some provision should be made to insure the timid cows of their proper share of the feed. A separate room or barn in which to milk the cows should be provided.

Figure 7 shows a plan of an open barn for housing cows in groups, each pen being provided with inexpensive mangers and stanchions for tying the cows while being fed. The size of pen shown is suitable for six large cows. Less floor and manger space is needed for smaller cows. For example, for large cows (Holstein-Friesian and Brown Swiss) allow 70 to 80 feet of floor space per cow, for medium-sized cows (Ayrshire and Guernsey) 70 square feet, and for Jersey cows about 60 to 65 square feet. This barn is suitable for moderate climates; more window space for additional circulation of air should be provided in warm climates. In extremely cold climates, fewer windows would be desirable, and the open front may be so arranged that it can be closed by means of doors that slide back along the partitions. This type of structure is inexpensive and provides for easy expansion. The most convenient number of cows per pen depends somewhat on the number handled and milked as a group in the milking barn. The optimum number for maximum production has not been determined, but it has been found that with the same allowance in square feet per cow the space and bedding are utilized better in large pens than in small pens.

FLOORS, VENTILATION, WINDOWS

Concrete generally is the cheapest, most durable, and most sanitary floor. A common mistake in laying concrete floors is to make them so smooth that cows will slip and fall on them when the floors are wet. Especial care should be taken to roughen the alleys where the cows walk. This can be done with a wire brush or broom after the concrete has been floated but before it has hardened. Roughening an old floor is a laborious job; probably an ax is about the best and easiest tool to use. Dirt floors should not be used in a milking stable. They are insanitary, they cannot be flushed and kept clean, and the cows soon wear or tramp holes in them.

Comparatively few of the barns in the northern part of the United States are well ventilated. One reason for this is that ventilating systems that depend on differences in the temperature of the air inside and outside the stable do not always change the air in the barn often enough. The outlet flue must be of ample size, tight, and well-insulated; the sides of the barn and the windows should be tight; and there should be built-in arrangements for admitting the fresh air. On farms having electricity these systems are being supplemented or replaced with electric fans which remove the air from the barns. In milder climates the tilting window is a cheap and practicable method of ventilation.

STALL EQUIPMENT

Of the various methods of confining cows, the swinging stanchion has met with the greatest approval. Types of such stanchions are

shown in figure 8. Some dairymen prefer to give the cows a little more freedom of movement than is permitted by stanchions. This



FIGURE 8.—Types of swinging stanchions: A, Metal reinforced with wood; B, tubular.

additional freedom is afforded by the type of tie shown in figure 9, which has sliding chains attached to a neck strap.

The type of stall shown in figure 10 is particularly effective in saving bedding. The horizontal pipes in front of the cow are to make her stand well back, except when her head is lowered in eating. A 2- by 4-inch piece on edge or a 4- by 4-inch piece split diagonally is adjusted just in front of her hind feet when she is standing in normal position. It is intended that the excreta will fall back of the 4-inch piece and that the cow in lying down will move forward to

avoid lying on the 4-inch piece. This crosspiece is also effective in holding the bedding on the platform.

Some dairymen who are intent upon providing optimum conditions regardless of expense keep their cows in box stalls. Cows so kept will produce a little more milk than if kept in stanchions, but the increase is not enough to pay for the extra labor and bedding required. Box stalls require more space than stanchions, the labor of feeding the cows and removing

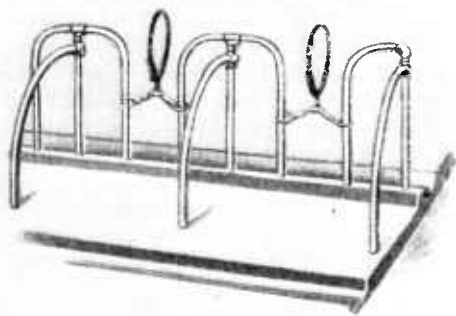


FIGURE 9.—A tie with sliding chains attached to a neck strap.

the manure is increased, and about three times as much bedding is used. There is no doubt that cows kept in box stalls are more comfortable and are less likely to have their teats injured by being stepped on by other cows. On dairy farms run primarily for profit, box stalls should be used only for cows that are ill or are freshening. Ordinarily 10 percent as many box stalls as milking cows will be plenty.

An investigation conducted at the Bureau's experiment farm at Beltsville showed that cows produced about 50 percent more milk when kept under optimum conditions than when kept under conditions such as would be found on an ordinary good dairy farm. Other investigators have found as much as a 70-percent increase. This 50- to 70-percent increase may be distributed as shown in table 2, using 100 as the production of cows when they receive ordinary good care.



FIGURE 10.—Modified Hoard stall.

TABLE 2.—*Increase in production and cumulative increase due to more favorable conditions*¹

Conditions	Increase	Total cumulative production ²
	Percent	Percent
Milking 3 times a day instead of twice	20	120
Box stall instead of stanchion	5	³ 126
Milking 12 months instead of 10 months	12-15	³ 141-145
Choice ³ feeds and more liberal feeding	5-15	³ 148-167

¹ Production under ordinary good care considered as 100 percent.

² Ordinary production plus increase due to optimum conditions.

³ Includes previous items.

EXERCISE

To prevent cows confined in stanchions from becoming stiff, they should be turned out at least once a day. When the cows are out, the stables are easier to clean and bed, and opportunity is afforded for observing any cows that may be in heat. Cows require no more exercise than is obtained in walking at will about a small yard. Exercise has been found to increase slightly the efficiency of digestion and the percentage of fat in the milk.

CLEANLINESS

GROOMING

Grooming cows daily, removing manure or litter from their bodies, not only improves the appearance of their coats, but also makes possible the production of cleaner milk. Washing and carding the tails occasionally adds much to the appearance of the herd. Vacuum grooming of cows in box stalls for a period of 4 months, at the National Research Center, Beltsville, Md., took more time than hand grooming and increased production only slightly. The cleanliness of the cows under the two methods of grooming was not noticeably different.

BEDDING

Bedding is used (1) to provide a comfortable bed, (2) to keep the cow clean, and (3) to absorb the liquid manure. The common bedding materials are wheat straw, oat straw, corn stover, shavings, and sawdust. The desirable qualities of a bedding material are bulkiness, large liquid-holding capacity, high fertilizing value, and freedom from dust.

Straw and shredded corn stover are more bulky than shavings or sawdust.

In liquid-holding capacity the following materials rank in the order named: Shredded or cut corn stover, straw, and shavings or sawdust. Corn stover has the greatest fertilizing value. Oat straw and wheat straw follow in the order named. Sawdust and shavings have only a small fertilizing value.

Shavings are the cleanest form of bedding and for this reason are much used in dairies where very clean milk is produced. In dairies where extra sanitation is not a matter of importance, shredded stover or straw is worth at least 50 percent more than sawdust or shavings. About 4 pounds of wheat straw per cow per day provides a suitable bed and keeps the cows clean when they are confined in stanchions. This quantity is not sufficient to absorb all the liquid manure; to do this, about 8 pounds per cow would be required for an average-producing herd. Cows in box stalls need about 14 pounds daily of wheat straw.

Dry, baled peat moss is used to a limited extent in dairies. In ability to absorb liquids it far exceeds any other bedding material, but in practice about as much peat moss as wheat straw is used per cow per day, as the quantity of bedding used depends more on its bulk than on its liquid-holding capacity. Experiments show that flies breed as readily in soiled peat moss as in soiled straw.

PAINTING AND WHITEWASHING THE STABLE

If the inside of the cow stable is to be painted, the woodwork or plastering should be smooth to avoid using excessive quantities of paint. A rough surface is preferable for whitewashing because the whitewash will adhere to it better than to a smooth surface. As compounds of lead are poisonous to cattle it is better to use paints that do not contain lead around the stalls and pens where it may be licked or gnawed off. Elsewhere lead paints may be used. Paint

while still wet is likely to be licked off by cattle; paint rags are likely to be chewed; and even buckets that have been used for the paint are dangerous. The lead is a deadly poison. Cattle must be kept away from the paint until it is dry, and all materials and utensils used in painting must be removed from the cowyards and stables.

Cow stables are usually whitewashed once or twice a year. Many whitewash formulas call for adding other substances such as salt or skim milk to the lime and water. Just how much advantage there is in adding such materials is a matter of conjecture. Satisfactory



FIGURE 11.—Whitewashing an old barn.

whitewash can be made by the use of lime and water only. The commercially prepared hydrate of lime makes a good whitewash when mixed with water; quicklime, ordinarily called lump lime, may be slaked with a minimum quantity of water and used instead. Only freshly burned lump lime should be used, and any that is air-slaked should be discarded, as whitewash made from such lime will not stick.

Whitewash may be applied with a brush (fig. 11), or with a spray pump. It can be applied more heavily with a brush, and sometimes one coat so applied will give as good results as two with a sprayer. Spraying, of course, is quicker but smears the floor and stable equipment more than applying whitewash with the brush. Whatever method of application is used, time in cleaning will be saved if the stable equipment is covered with old bags or similar material. If

the floor is kept wet while the whitewashing is in progress, the whitewash that is dropped can readily be dislodged with water and a brush or broom.

DISPOSING OF MANURE

The advice generally given for handling manure on the dairy farm is to spread the manure on the land as soon as possible after it is made (fig. 12). With certain reservations, this seems to be sound advice. It is questionable whether manure handled in this way in the winter gives greater returns than manure which has been properly stored, but the practice does give better distribution to farm labor and obviates the necessity for providing large storage facilities.

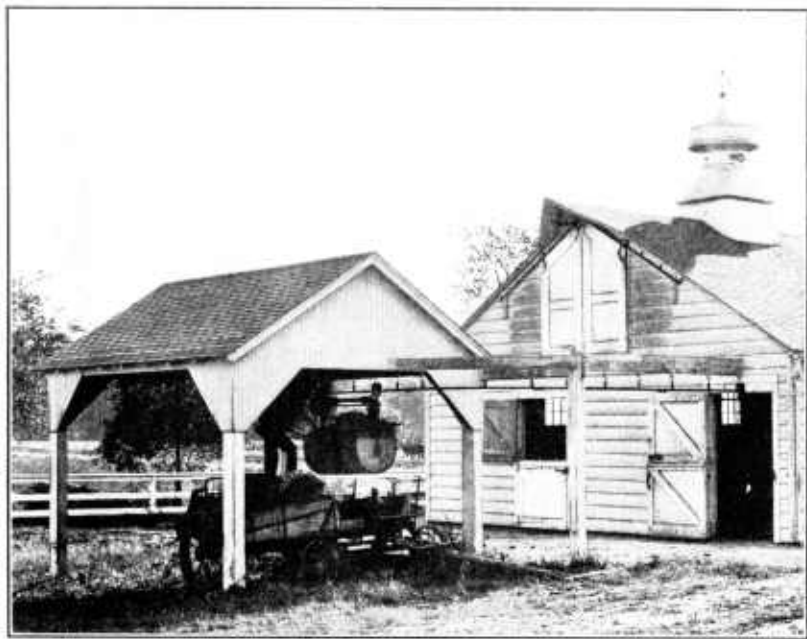


FIGURE 12.—Loading out manure from the barn to the spreader.

Spreading manure on snow, though often advised, is a questionable practice on account of washing, especially if the land is rolling. Probably it is also inadvisable to haul manure onto the fields when the ground is so soft that the wagon makes deep ruts. If the ground is soft or covered with snow, it is better to pile the manure on high ground along the side of the field to be manured, in such a way that any leachings will run onto rather than off the field. This puts the manure in convenient position to spread when conditions are favorable.

When farm work is pressing, manure hauling to the fields must be delayed. Storage of manure cannot well be entirely avoided, therefore, and a suitable storage place should be provided in order to prevent excessive loss of fertilizing ingredients. In storing manure, plenty of moisture and thorough packing are the main

things to consider. Where bedding is cheap, enough can be used to absorb the liquid manure; where it is costly the liquid can be drained into a cistern, or stored with the solid manure in a water-tight manure pit. All manure should be removed from the stanchion barns at least once a day. In well-bedded open sheds or barns where the cows are loose, the manure may be allowed to accumulate for several months and be removed when it is convenient.

The equipment used in removing manure ranges from a wheelbarrow to a power conveyor running in the gutter behind the cows. In dairies of medium to large size the most popular device is the litter carrier with overhead track such as is manufactured by several barn-equipment firms. The carrier may discharge directly into a manure spreader or wagon or may go to a manure pit or other storage place. Inclosing or screening the manure pile will help to control flies.

KEEPING RECORDS

In order to manage a herd of dairy cows properly, it is necessary to keep records. The record system need not be elaborate, but should furnish accurate information on the milk and butterfat production of the individual cows and on the quantity of feed consumed. In additions, breeding records and breeding dates should be recorded, and a plan of identifying and registering the animals should be followed. One should not rely on memory for such information, but should put every item down in writing in such a manner that it can easily be referred to when need arises. The records should not be allowed to lapse.

PRODUCTION RECORDS

The principal object of keeping milk-production records is to show definitely which cows are profitable and which are not. The inferior cows can then be disposed of and the better ones kept for production and breeding.

Another important advantage of milk-production records is that they can be used as a basis for determining rations. Cows should be fed according to the quantity of milk or butterfat they produce. Sickness or other abnormal conditions are generally preceded or accompanied by a decrease in milk production. The practice of weighing and recording the milk each day helps to detect troubles at their onset.

Spring-balance scales are necessary. These scales are equipped with adjustable hands, one of which is set at zero when an empty pail is hung on the scale. The quantity of milk may then be read without subtracting the weight of the pail. The milk scales should be graduated to tenths of a pound. If milk pails of different sizes are used by the milkers, it is a good idea to keep a weigh pail at the scales to avoid confusion. The scales should be hung in a convenient place in the barn or milk room.

A suitable sheet on which to record the weight of milk from each cow should be placed in a clean, protected place near the scales (fig. 13). Spaces are provided on these sheets in which to write the name or number of each cow and to record the weights of the milk for each milking during the day. Some sheets have spaces for 7 days only,

but sheets with spaces for an entire month are most commonly used. Scales and milk sheets can be obtained from dairy-supply houses. Many publishers of dairy periodicals also distribute milk sheets at nominal prices.

At regular intervals a composite sample of milk from each cow should be tested for butterfat. This composite sample is obtained as follows: For 1 day or 2 consecutive days each month take a sample



FIGURE 13.—Milk-production records show the profitable cows.

of each cow's milk, night and morning, the quantity of the sample depending on the quantity of the yield. The proper quantity can be obtained by the use of a "milk thief" and a bucket or can with straight sides or by taking a certain number of cubic centimeters for each pound of milk yielded. Each sample is then thoroughly stirred and mixed with the previous sample or samples to obtain the composite sample for testing. The percentage of butterfat in the composite sample is determined by the Babcock test. The butterfat percentage obtained by testing this sample is used as the average percentage for the month, and the monthly butterfat production is computed from it.

For small herds other methods of keeping milk and butterfat records may be used, such as weighing the milk from each cow for 1 day during the month and testing it for butterfat. The total yearly production of milk and butterfat from each cow, as shown by such tests, will be close enough to actual production for practical purposes. In some dairies the milk is weighed and tested 1 day every 2 months. This method is not so accurate as testing 1 day each month, but there is not a great deal of difference between the two methods.

In keeping a permanent record of each cow's monthly production of milk and butterfat and the percentage of fat, these may be entered on a large card or sheet with space enough for eight lactation records or years, or enough for the average productive life of a cow. There

should be space for remarks on any unusual condition affecting the cow's production or health. On the back of the card may be recorded the cow's herd number, date of birth, name and registration number, and pedigree.

If a dairyman is a member of a dairy herd-improvement association, the production records of his cows are kept by the tester hired by the association (fig. 14). The tester visits each member's herd 1 day each month, weighs and tests the milk of individual cows for that day, weighs the feed and figures the total milk and butterfat production and the feed consumed for the month. At the end of the year the production of individual cows and the entire herd is summarized. This has proved to be an economical and reliable method of keeping herd-production records for a number of dairymen in a community.⁴ The herd-testing plan described later, which has been



FIGURE 14.—The tester tests the milk for percentage of butterfat.

adopted by most dairy-cattle breed associations, serves essentially the same purpose.

BREEDING RECORDS

A record should be made of the date of breeding, the bull used, and date of expected calving. The gestation period for cows is approximately 282 days. It is well to have a gestation table handy for reference in estimating the date of calving. If such a table is not available, count back 3 months from date of breeding and add 10 days. For example, if a cow is bred on March 10, by counting back and adding 10 days, the probable date of calving is found to be December 20. It is well to have the breeding record both in a small pocket-size notebook that can be carried in the work clothes and in some other

⁴ For further information concerning dairy herd-improvement associations, see Farmers' Bulletin 1604, *Dairy Herd-Improvement Associations and Stories the Records Tell*.

form not so likely to be lost. Most of the national dairy-breed associations distribute small record books and blanks of this kind. Such books are especially helpful if the herd includes registered animals.

An example of a breeding and calving record for a cow in one of the herds of the Bureau of Dairy Industry, which illustrates a very simple and convenient method for recording breeding and freshening dates, follows. A small card is used for each female in the herd, and the set of cards is kept in a small filing box. On one side of the card near the top is written the herd number, name, and date of birth of the female, also the names of her sire and dam. On the lower portion the freshening dates, sex of each calf, and the sire of each calf are listed. The opposite side of the card is used for listing the breeding dates and the sire to which the cow was bred.

EXAMPLE OF A CONVENIENT BREEDING AND CALVING RECORD

(FRONT OF CARD)

H-80:

Born July 23, 1938

Pride Friend Duchess Hetty 1337807

Sire: Pride of the Bess Burkes 294574 (Herd No. H-153)

Dam: Friend Duchess Hetty Walker 1025956 (Herd No. H-52)

Freshened:

	<i>Calf</i>	<i>Sire of calf</i>
Oct. 19, 1931.....	Male (dead at birth).....	H-181
Dec. 14, 1932.....	Female, H-309.....	H-181
Dec. 22, 1933.....	Female, H-329.....	H-181
Feb. 1, 1935.....	Male, H-535.....	363
May 23, 1936.....	Male, H-556.....	363

Sold May 29, 1936.

(BACK OF CARD)

Bred:

	<i>Bull used</i>
Apr. 10, 1930.....	H-174
May 1, 1930.....	H-181
June 5, 1930.....	H-181
June 28, 1930.....	H-181
July 20, 1930.....	H-181
Nov. 21, 1930.....	H-181
Jan. 14, 1931.....	H-181

Bred—Continued.

	<i>Bull used</i>
Mar. 12, 1932.....	H-181
Mar. 18, 1933.....	H-181
Apr. 1, 1934.....	363
Apr. 26, 1934.....	363
June 2, 1935.....	363
Aug. 19, 1935.....	363

REGISTRATION AND IDENTIFICATION

When a calf is dropped or a new animal is added to the herd, it should be assigned a name or number, and to avoid conflict the numbers should not be repeated. Many breeders attach to an animal's ear a fiber-disk eartag on which the herd number is stamped. This tag is about the size of a quarter and is durable (fig. 15). It is attached with an ordinary hog ring and ringer, and if this is put on properly it is not easily torn out, nor is it easily confused with the small metal tags that may be placed in the ear for identification in tuberculin and Bang's disease testing.

A strap around the neck, to which is attached a metal tag with a herd number on it, is sometimes used. The strap will last for several years, and there is little likelihood of its being lost. However, straps are more expensive than fiber eartags. The practice of slitting or notching the ears for identification is not recommended because it gives the animal a bad appearance.

Some breeders tatoo numbers in the ears of their animals, and such marks are required for identification by some breed associations. Tattooing outfits are on the market. If the tattooing is properly done, it will last for the lifetime of the animal. However, the tattoo marks do not show distinctly on animals having dark skins. Even on light skins the tattoo numbers are often difficult to make out, and it is necessary to catch and hold the animal in order to see them.

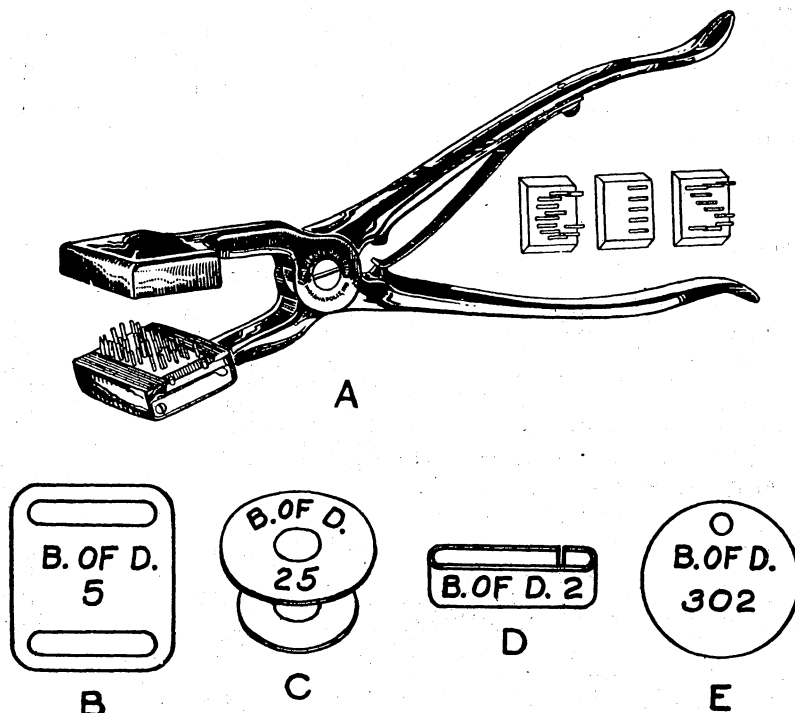


FIGURE 15.—Devices for marking cattle: *A*, Tattooing outfit; *B*, metal tag to go on strap around neck; *C* and *D*, metal eartags; *E*, fiber-disk eartag.

A diagram showing the color markings of broken-colored animals can be drawn on a loose-leaf form provided by the breed associations. On the opposite side of this form is usually a three- or four-generation blank pedigree. A form of this kind filled out for each animal in the herd and kept in a holder will be of great help to the owner.

Registration papers for all registered animals should be kept on hand. Calves should be registered as soon as practicable. The national dairy-breed associations furnish directions and advice for registration. Their names and addresses are:

American Dairy Cattle Club, 11 S. LaSalle Street, Chicago, Ill.
 American Guernsey Cattle Club, Peterboro, N. H.
 American Jersey Cattle Club, 324 West Twenty-third Street, New York, N. Y.
 Ayrshire Breeders' Association of the United States of America, Brandon, Vt.
 Brown Swiss Cattle Breeders' Association of America, Beloit, Wis.
 Dutch Belted Cattle Association of America, Buchanan, Mich.
 Holstein-Friesian Association of America, Brattleboro, Vt.

ADVANCED-REGISTER TESTING

The national dairy-breed associations have established advanced-register classes for purebred cows. Animals are entitled to entry in these classes when their production has reached a certain standard set by the association. Most of the breed associations have also adopted the herd-test plan under which all the registered cows of the herd are tested. The herd tests and those for entry into the advanced-register class are usually conducted by representatives of the State agricultural colleges or experiment stations. Rules and regulations for conducting them differ according to the breed and the kind of test undertaken. Information can be obtained by writing to the breed associations or the State agricultural experiment stations.

BUYING AND SELLING DAIRY CATTLE

RAISING VERSUS PURCHASING FOR REPLACEMENT

Many dairy cattle are bought and sold each year. A beginner purchases cattle to establish his foundation herd. The owner of an established herd finds it necessary to dispose of surplus animals in order to maintain his herd at the desired size. Many dairy animals, because of old age, low production, disease, or unsoundness, are disposed of for beef. In some sections, especially those adjacent to market-milk centers, many dairymen do not raise young animals to replenish their herds but buy fresh cows when additional milk is needed. They believe this method is cheaper than raising calves and heifers on expensive milk and other feeds. In some other sections removed from market-milk centers, many dairymen make a considerable portion of their income by raising dairy cattle to sell.⁵

The general practice of replacing by purchasing is not conducive to improvement in the production of the herd. There is also the great danger of introducing disease when new animals from different herds are constantly brought in. Finally, this method provides little opportunity for the herd to increase in value, because mature animals are purchased, and their value will decrease. If young animals are raised for herd replacements, their value tends to increase as they grow to maturity.

POINTS TO OBSERVE IN PURCHASING DAIRY CATTLE

The buyer of dairy cattle is usually at a disadvantage, because in many cases production records are not available and he must rely largely on the appearance of the animals. If the buyer is inexperienced, he should obtain the advice of an experienced man. Several points should be kept clearly in mind.

(1) The breed and class of cattle to be purchased must be decided upon. Dry cows or bred heifers ship better than do milking animals and do not need attendance unless the distance is great. The danger of introducing mastitis into a herd is less when heifers are purchased. Often cattle of one particular class are in greater demand than those of another, and in some localities are consequently higher priced. For instance, during the flush-pasture season, when milk is relatively cheap, heavily milking cows usually are cheaper than cows bred to

⁵ For information on the raising of dairy calves and heifers, see Farmers' Bulletin 1723, Feeding, Care, and Management of Young Dairy Stock.

freshen in the fall and winter, when milk prices probably will be higher.

(2) A locality where the particular breed of cattle sought predominates is usually the best place in which to buy any considerable number of cattle. By buying where there are large numbers of cattle greater opportunity for selection is possible. If a buyer desires to purchase a carload (15 or 20 head), it may be necessary to examine 60 to 75 animals in order to secure those of the class desired.

(3) Only sound, healthy cattle should be bought. It rarely pays to buy unsound cows, such as those having faulty udders, knocked-down hips, etc. Even if the best judgment is used in making selections, some animals will be disappointing. Never purchase animals from herds that show evidence of having contagious diseases.

The Federal-State accredited-herd and accredited-area plan for eradicating tuberculosis reduces to a minimum the danger of purchasing animals infected with this disease (p. 28). Animals should be purchased only from accredited herds or from herds in accredited areas. It is now possible in most regions to purchase animals from such herds. Nearly all the States are now listed as modified accredited areas.

Bang's disease or infectious abortion probably offers the greatest difficulty to purchasers of dairy cattle. The safest rule is to purchase animals from herds that are known to be free from abortion disease. Most States have laws requiring that all dairy cattle brought into the State and not intended for immediate slaughter must pass a negative blood test prior to entry into the State. In some States there are restrictions on the movement of cattle within a State. A system of testing and official recognition similar to the Federal-State plan for the eradication of tuberculosis is now in extensive operation in many States and buyers of dairy cattle can be reasonably sure of obtaining cattle free of Bang's disease if they confine their purchases to the districts where area testing has been in operation for some time. By careful observation and questioning, facts about the breeding condition of a herd often can be ascertained. Normal herds should produce almost as many calves each year as there are cows in the breeding herd. The number of calves produced in a herd during the period of a year is therefore a good indication of the breeding condition of the herd and its freedom from abortion disease. It is still desirable, however, to depend on the blood test for the final determination of the freedom from abortion disease.

Newly purchased animals should be quarantined if possible for 60 days before being turned in with the herd. If they are bought subject to a 60-day retest for tuberculosis or Bang's disease, this quarantine period makes it possible to obtain the retest before they are placed in the regular herd. Most abnormal conditions will have manifested themselves by that time.

SHIPPING DAIRY CATTLE

Dairy cattle can be transported by motortruck or by rail. Over long distances it is usually advisable to ship them by rail. Cows in milk should have an attendant. A closed car is preferable to a stock car for shipping dairy cattle. The car should be well bedded, and provision should be made for feeding and watering en route. In

most cases, if enough good hay to last the cattle en route is provided, no other feed will be necessary. One or two clean barrels should be filled with water with a float on top or a canvas cover to keep the water from slopping out. Buckets with which to water the animals should be provided. If the barrels do not hold sufficient water to last the entire trip they can be refilled at stops. If barrels and buckets are provided, the train crew will see that the animals are watered.

The car should be thoroughly cleaned and disinfected before cattle are loaded into it. This disinfecting is best accomplished by thorough spraying with an efficient disinfectant.⁶

In shipping young animals, it may be best to turn them loose in the car, or if there are only a few of them they can be penned in one end. It is best to tie cows, preferably in the ends of the car, and leave space in the center of the car for barrels, buckets, and extra feed.⁷

COMMON AILMENTS OF DAIRY COWS

INDIGESTION

When a cow has indigestion, commonly termed being "off feed," she refuses part or all of her ration, she is dull, she may have fever, and her milk yield is diminished. Although her appetite may return to normal in 1 or more days, depending upon the severity of the attack, her milk yield is generally somewhat slower in doing so.

Common causes of this trouble are too much concentrated feed; moldy, decayed, or unsuitable feed; insufficient water; and cold drafts. The treatment consists in reducing the quantity of feed given, removing any spoiled feed, giving plenty of water to drink, and administering a purgative, preferably Epsom salt, as a drench. The medicine usually is mixed with water or other liquid, placed in a long-necked bottle, and given to the animal through the mouth. A simple drenching tube can be made from an ordinary tin funnel and a piece of rubber hose. Such an apparatus is especially convenient for giving large quantities of liquid.

In giving a drench it is important to prevent any of the liquid from passing into the lungs, as this may cause pneumonia. The animal's head should be elevated and held with the attendant's arm only, not tied up. The head can then be lowered quickly and easily in case there is any sign of choking. If the animal is held by the nose, care should be taken that it is still able to breathe through the nose. Insert the mouth of the bottle, or the end of the tube, at the side of the mouth in front of the back teeth and on top of the tongue and administer the liquid slowly so as to give the animal plenty of time to swallow.

Drenching should be done by an experienced person or by a veterinarian.

TUBERCULOSIS

Tuberculosis is infectious and may take a number of years to run its course, often with no visible symptoms during the early stages of the disease.

⁶ For specific information on disinfectants, see Farmers' Bulletin 926, *Some Common Disinfectants*.

⁷ Additional information on the shipping of cattle is contained in Department Leaflet 38, *Maintaining the Health of Livestock in Transit*.

The disease may be introduced into a herd by bringing in diseased animals, by allowing cattle access to streams of water which have been polluted by the droppings of tuberculous cattle, by feeding calves milk from tuberculous cows (this may happen in using unpasteurized skim milk or whey from a creamery or cheese factory), by showing cattle at fairs, by shipping cattle in infected cars, or by pasturing them with other cattle that have the disease.

The most reliable way to tell whether living cows have tuberculosis is to have them tuberculin-tested by a competent veterinarian.

Of all the plans tried for eradicating tuberculosis, the accredited-herd plan and the modified accredited-area plan have been the most successful.⁸ Under these plans all the cattle in a given herd, or in a given area, are tested for tuberculosis, and those found to be tuberculous are disposed of so that they may not continue to be sources of infection for healthy animals.

BANG'S DISEASE

Bang's disease is infectious and prevails widely in dairy herds. The bacteria responsible for this affection are often present in the uterus and udder of the infected cow. Large numbers of the bacteria are often expelled when the cow calves or when the fetus is aborted. Cows acquire the disease by consuming feed or water that has been contaminated with material from the genital organs and by licking fetuses, afterbirths, and discharges contaminated with the disease.

STERILITY

Sterility, or barrenness, is prevalent in dairy herds and may be temporary or permanent. Its presence interferes with the normal increase of the herd and leads to the maintenance of an excessive number of dry cows.

A number of causes may result in failure of a cow to conceive. Sometimes the fault is with the cow, sometimes with the bull. Each case, therefore, must be considered separately, both as to its cause and to its treatment.

Some cows may be sterile because of some dietary deficiency; of inflammation, cysts, tumors, or other disorders of the genital organs; of lack of tone in the genital organs; of arrested development of certain generative organs; or of bacterial or parasitic infection. There are so many things that may cause sterility, many of which are so difficult to identify definitely, or diagnose, that no one type or kind of treatment will correct sterility in a herd of cows unless by chance they should all be sterile from the same cause and the treatment given should happen to be the one that was a specific for that particular cause. This is the reason that some cows may appear to be helped by the feeding of sprouted oats or cottonseed meal, whereas other cows do not appear to be benefited by such treatment; some cows appear to be benefited by the massage of the genital organs by a trained operator, but others are not. In some cases, heat periods may sometimes be induced by massaging the ovaries. Usually it is advisable to have a veterinarian diagnose the cause of the sterility, when possible. If the cause can

⁸ Detection, control, and eradication of this disease are discussed fully in Farmers' Bulletin 1069, Tuberculosis in Livestock. Detection, Control, and Eradication.

be definitely diagnosed there is much greater probability of restoring the animal to normal breeding condition.

Cows with relaxation or lack of tone of the uterus may not conceive. Their genital organs hang far forward in the abdominal cavity as if they were entirely inactive. Most of these cows show increased vigor and muscular tone when forced to walk several hours each day, and a large percentage of them become pregnant.

An infectious disease known as trichomoniasis has been receiving much attention in the United States in recent years. It affects the genital organs of both males and females. It often produces temporary sterility in females and occasionally permanent sterility. Heifers seem to be more severely affected than older cows. In some cases it causes abortion, and in some cases it produces maceration of the fetus in pregnant animals. The liquefied fetus may be expelled early in gestation or may be held in the uterus until after full-term pregnancy should have terminated. At present no satisfactory treatment is known, but the incidence of infestation may be reduced by keeping all animals that are discharging a whitish fluid, isolated.

DIFFICULT CALVING

Usually a cow will calve without assistance if she is not disturbed. At calving time she should be placed in a clean, well-bedded stall. Before labor has progressed to any great extent, it is well to see the presentation of the fetus is normal; that is, that the front feet and nose are first to appear. Sometimes one or both feet or the head is doubled back. When this occurs, calving without assistance is difficult or impossible. The calf should be placed in proper position to be delivered and this usually necessitates pushing it back into the uterus, an operation which is sometimes rather difficult. Unless a person is skilled in such work it is better to call a veterinarian than to attempt it unaided. A bungled job may mean serious laceration of the uterus or vagina, or death of the cow or calf. Calves can be born hind feet first. When this occurs, some one should be on hand to see that delivery is hastened at the critical moment; that is, when the blood supply to the calf through the navel cord is shut off. The calf must then be able to start breathing, or it will smother.

Sometimes assistance is needed, especially by young cows, even when the presentation is normal. Hence the cow should be watched rather closely, but no help should be given unless it is necessary. Time must be allowed for the relaxation of the openings from the uterus and vagina. In general, labor pains should continue for several hours before any help is given, although the condition of the cow should be taken into consideration. She should not be allowed to become too much exhausted before receiving help.

In helping the cow, take hold of the calf's feet if they protrude; otherwise pass cotton ropes around them, and pull only when the cow strains. The direction of the pull should incline toward the cow's hocks and not be directly away from her body.

As soon as the calf is born, clip the navel cord about 1 inch from its belly, squeeze out the few drops of blood, and apply tincture of iodine.

RETENTION OF THE AFTERBIRTH

The afterbirth is usually expelled within a few hours after the birth of the calf, but if it is not expelled naturally within 36 to 48 hours most veterinarians believe it advisable to remove it by hand. Removal by hand, however, should not be undertaken until it is evident that natural expulsion will probably not occur. If manual removal is necessary, it should take place before the cervix has closed to such an extent as to make insertion of the hand difficult. This operation should not be attempted by an unskilled person, as care must be exercised to avoid forcible dilatation of the cervix or injury in disengaging the cotyledons which attach the afterbirth to the uterus. Special effort must be made to remove all the afterbirth. Care must also be taken to avoid introducing infection into the uterus by unclean hands or a contaminated irrigating tool. The external genitals of the cow should be thoroughly cleaned before one attempts to pass the hand or instruments into the uterus. Should a discharge develop after the removal of the afterbirth, it is advisable to have a veterinarian administer proper treatment to prevent the development of septic metritis or inflammation of the uterus.

While there can be no question from the standpoint of sanitation that the removal of the afterbirth by hand is preferable to leaving it to come away naturally, some dairymen claim the latter practice is better for the health of the cow. When it is left to be passed naturally, the insertion of one or two boric acid capsules well forward in the uterus will help to prevent putrefaction and bad odors. Cows with retained afterbirth should be kept out of the milking stable and away from other cows.

MILK FEVER

Milk fever is a disease that generally attacks mature cows that have had three or four calves. It usually occurs within 3 days after the cow calves. It may, however, attack any cow at any time during her lactation period or a day or two before calving. High producers or fat cows are more subject to milk fever than low producers or thin cows. It is thought that plenty of water and salt and very little concentrated feed for several days before and after calving will help prevent this disease.

Milk fever may be recognized by the cow's staggering gait and lack of control of her hind legs. As the disease progresses the cow goes down in a stupor, lying in a normal position, except that her head is usually turned to her flank. Later, paralysis may become general, and then the cow lies on her side.

One method of treatment consists of inflating each quarter of the udder with air filtered through a liquid or cotton. Almost any sort of air pump will serve to force the air into the udder. Every dairyman should keep a milk-fever outfit on hand for quick use. Satisfactory outfits can be bought, or they can be made at little expense from a bicycle pump, rubber tubing, a piece of large glass tubing in which to place the cotton, and a milk tube. Care must be exercised to have the milk tube sterile, and the ends of the teats should be cleansed with a disinfecting solution. After inflation the teats should

be tied with tape to prevent escape of the air. Ordinarily one inflation is sufficient; but in case the cow shows no improvement in 2 hours, the inflation should be repeated. See that the cow lies on her brisket rather than flat on her side. Bags or bales of straw or hay can be used to prop her in position.

Another method of treatment consists of injecting calcium gluconate intravenously. This is the preferable treatment since it eliminates the possibility of infecting the udder, which sometimes occurs when the udder is inflated with air.

MASTITIS

"Mastitis," "mammitis," and "garget" are terms used more or less synonymously to denote inflammation of the udder. The primary cause of mastitis is the presence of certain kinds of bacteria in the udder. So far as is known, the bacteria gain access to the udder through the teats. These bacteria are transmitted from one cow to another by the milk of an infected cow coming in contact with the teats of a healthy cow. This may be brought about by the milk-er's hands, the teat cups of milking machines, rags used in cleaning the udders before milking, or milk spilled or milked on the bedding or floor of the stalls.

There are two forms of the disease, acute and chronic. The chronic form may be present in affected animals without any symptoms being evident to the untrained observer. Special tests are required for its detection. This form of mastitis generally persists in the cow for the remainder of her useful life. No effective treatment has been developed for the permanent cure of chronic mastitis. Segregation of the diseased animals from the healthy ones, at least for milking, and the use of sanitary measures are recommended for controlling its spread in the herd.

The acute form of the disease varies greatly in severity. In some cases, it is so mild that its existence is indicated only by the presence of an occasional clot or flake in the milk and by signs of a slight tenderness or pain when the animal is milked. In the more severe cases, one or more quarters of the udder may be greatly swollen, hard, hot, and sensitive to the point that walking is painful. Milk production is reduced and the milk is usually watery and also contains clots, flakes, and even strings of tissue. Other cases of inflammation may be so severe as to cause the death of the cow.

Acute mastitis may be caused by the recent invasion of the udder by these bacteria, or it may be simply an acute attack of an already-established case of the chronic form of the disease. Such an attack may be brought about by (1) exposure to drafts, or extremely cold or very hot weather; (2) bruises or injuries to the teats and udder; and (3) disturbances of the digestive tract.

To prevent the spread of the disease and to assist in the early detection of acute attacks, the milk from each cow in the herd should be examined at least once a day. Draw a few streams of the fore-milk from each teat into a strip cup that has a fine wire or black cloth strainer in its top. If any flakes or clots show in the strip cup, or if any other symptoms of mastitis are noted, separate the affected cows in the stable from the healthy cows, and milk the

affected cows last at all times. When such symptoms appear in either healthy or previously affected cows, treatment should be begun immediately to reduce the severity of the attack. Washing the hands before milking each cow and using clean cloths to cleanse the udder before milking will help to avoid carrying bacteria from one cow to another; or if a milking machine is used, the teat cups should be rinsed in water and dipped in a chlorine or other suitable disinfecting solution before each cow is milked. The floors of the stable should be kept free of milk.

Treatment⁹ consists in giving a dose of Epsom salt or other purgative, in frequent milking, and in applications of heat to the affected parts for at least 30 minutes several times a day. Heat is most conveniently applied by the use of a rubber bag which surrounds the udder and which can be filled with hot water. After making the hot applications, dry the udder and massage it with oil, to prevent chapping. Treatment is more successful if applied immediately than if delayed. Any special treatments, such as the use of bacterins, should be given only under the direction of a veterinarian. Cows that have very severe cases of mastitis may recover and appear to be normal, but the trouble is quite likely to recur.

COWPOX

Cowpox is an infectious disease which causes characteristic sores on the udder and teats. Tenderness and redness of the teats occur first, and are followed by an eruption of grayish-red nodules. A vesicle or blister filled with transparent fluid forms in the center of each nodule within 7 to 10 days. Later the fluid becomes purulent, and the final drying out of the lesion results in scab formation. Milking or handling the udder or teats during the pustular stage may result in rupturing the blisters, and consequently may interfere with the healing of the lesions as well as spread the infection to other cows.

Treatment consists of healing the sores left by the blisters. Any oil or neutral ointment is a very good remedy, as it keeps the affected parts soft, thus preventing cracking and bleeding. Since this disease is commonly carried from one cow to another by the milkers, the affected animal or animals should be milked last; and, as a further safeguard, the milker should cleanse his hands after milking each cow in the herd.¹⁰

FOUL FOOT

Foul foot is rather common in dairy herds. This disease causes great reduction in milk flow as well as rapid loss of weight of the animal. The hind feet are most likely to be affected. It is thought that infection from stable filth gains entrance through an abrasion or from foreign matter wedging and remaining between the claws until irritation is set up. The affected foot becomes inflamed, sore between the claws, and gives off an offensive odor.

Treatment should be administered at the first sign of the disease. If it is delayed, the trouble may become more or less chronic and spread to the joints of the legs or to other parts of the body. Clean

⁹ See Farmers' Bulletin 1422, Udder Diseases of Dairy Cows.

¹⁰ See footnote 8.

the affected part and treat it with a strong disinfectant. In advanced cases the animal should be confined to a clean stall, or it may be necessary to put a pad and bandage between the claws to keep out dirt until healing takes place.

BLOAT

Bloat may be produced by any kind of feed which causes indigestion and forms gas in the paunch. Young clover and alfalfa pasture are especially likely to cause bloat, although soybean hay, alfalfa hay, and other feeds may sometimes produce the trouble. The conditions that appear to be most favorable for the development of gases in the paunch when cattle are pastured on clover and alfalfa are high moisture content and immaturity of the herbage, a pure stand of the clover or alfalfa, and overeating by the cattle when first put in the pasture. Investigations have been made to determine what chemical property is responsible for bloat but so far the matter is still unsettled.

Methods that have been advocated to prevent bloat are: Always give the animals a good fill of other feed before they are turned on the clover or alfalfa pasture. Thereafter keep them on the pasture continuously enough so that they will not become so hungry as to overeat. The herbage should not be wet with dew or rain when the cattle are first turned on the pasture. Provide either some dry roughage in the pasture which the cattle can eat at will or give them access to a pasture in which grasses rather than legumes predominate. Allowing the alfalfa to reach a fair degree of maturity before turning the cattle on it appears a less dangerous practice than pasturing it when very immature.

In cases of bloat the paunch is inflated most noticeably on the left side. In severe cases the distention may extend above the back. When tapped with the fingers the paunch gives a drumlike sound. When bloat is pronounced, the animal has difficulty in breathing. Place a rope, hose, or bit of some kind in the animal's mouth and exercise the animal by compelling it to walk. Making the animal stand with the front feet higher than the hind feet is also helpful. The purpose of this treatment is to get rid of the gas through the mouth. If this treatment is not effective, give 2 tablespoonfuls of turpentine or formalin in 1 quart of warm water as a drench. Of these two remedies the turpentine is preferable. After bloating has subsided, give 1 pound of Epsom salts in 3 pints of warm water as a drench. If these remedies are not effective and in urgent cases where the gas must be allowed to escape without delay, it may be necessary to puncture the paunch. This is best done with a trocar and cannula. The trocar is a sharp-pointed instrument which fits smoothly into a hollow tube called the cannula, leaving the sharp point exposed. After inserting the trocar and cannula by a quick, firm thrust inward, downward, and forward, the trocar is pulled out and the cannula left in the opening. This will allow the gas to escape. The paunch is punctured on the left side with the trocar at a point equidistant from the last rib, the hip bone, and the loin.

The animal should be fed sparingly on easily digested feed for several days after bloating has stopped, so that all fermenting material may pass out of the stomach.

NAILS OR WIRE IN THE STOMACH

Cows will eat pieces of wire, nails, small stones, and other objects when mixed with their feed, if in the bedding, or anywhere within reach. There is one compartment of the stomach where such material is collected and held. Most of it does no apparent harm, but occasionally a sharp-pointed object punctures the wall of the stomach and either pierces the heart or other vital organ or sets up an infection which eventually is fatal. Pieces of wire 2 or 3 inches long, of the kind used for baling wire or light fencing, are the most common causes of trouble of this sort.

The symptoms first noticed are general depression, refusal of feed, and reluctance to move. If infection has been set up by the foreign body the animal may have a fever. When a cow is suffering from a wire or nail coming in contact with the heart or the sac surrounding the heart, the breathing becomes short and often each respiration is accompanied by a gentle grunt. The heart beats much faster than normal. Sometimes, in advanced stages, the splash caused by the beat of the heart in the fluid surrounding the heart is plainly audible, and the brisket may become swollen.

Affected cows nearly always die. Operations to remove the foreign bodies have been performed successfully by skilled veterinarians, but generally by the time the trouble can be definitely diagnosed, it has progressed to a stage where an operation will not save the animal's life. The usual treatment consists in keeping the animal as quiet as possible and in avoiding the feeding of large quantities of roughage.

In combating this trouble the dairy farmer must rely upon prevention rather than cure. Pliers instead of a hatchet or ax should be used for cutting the wire on baled hay or straw since they sever the wire at one cut and there is less likelihood that short pieces will be broken off and mixed with the hay or straw. The use of baling wire for making repairs or for other purposes around the cow stall should be avoided. Fencing that is falling apart on account of rust should be disposed of, as cows often reach under the fence to get grass. Some farmers and most feed manufacturers have provided magnets for removing wire and other metals (especially iron or steel objects) from all ground feed, but so far no practical method has been devised for removing such objects from roughage.

WARTS ON THE TEATS

Warts on the teats may sometimes attain sufficient size to interfere with milking. One method of removing them is to apply castor oil or pure olive oil after each milking for a week. If this treatment fails, the warts can be touched with a stick of lunar caustic and the oil applied after that. Long warts that are not too large at the base may be removed by tying a silk thread tightly around the wart near the teat and allowing the thread to remain until the wart drops off.

CRACKED TEATS

Sometimes a cow's teats chap in the winter from exposure and cold when they are moist. The remedy is to milk with dry hands and to see that the teats are dry when the cow is turned out into the cold. Wet milking and the sucking of the calf make them more

liable to chap. In case cracking occurs, the treatment consists in keeping the teats soft with applications of oil or salve. This will protect them from excessive drying and continued cracking.

INSECT PESTS

WARBLES

Warbles or grubs are the larval stage of the warble or heel fly. The larva is about $\frac{1}{2}$ to 1 inch in length and is whitish or brown in color. In the spring the grubs are found under the skin of the cattle, along the back. They cause the animals to fall off in flesh and lower the value of the hide because of the holes they make in it. They probably also reduce the milk flow, although no investigations on this subject have been made. These grubs should be forced out through the hide by pressure beneath the lump, and should be destroyed. Applications of fly sprays during the summer are probably of little value in keeping off warble flies.¹¹

LICE

The first effects of infestation by lice are usually a scurfy skin and patches of hair falling out around the tailhead or the withers. Unless the lice are killed, the animal may become thin and lose much of its hair. Young calves especially are affected. Lice are destroyed readily by a solution of a standard stock dip. Recommendations for preparing the solution are given on the container and may be followed with safety. Although the dipping vat is the easiest and most effective means of killing the lice on dairy cattle, the expense of building and maintaining a vat for this purpose is too great to justify its use. It is not a big job to go over the herd by hand with a brush and the disinfecting solution. If this is done in the winter, a mild day should be selected. Ordinary powdered borax sprinkled along the top line of the animal from poll to tail will lessen the attacks of the lice until a more thorough job with a stock dip can be done.¹²

FLIES¹³

Flies are a great nuisance around a dairy. Houseflies may contaminate the milk, and they annoy the cattle by feeding on eye and other body secretions. Houseflies do not have piercing mouth parts; their food is organic matter. Stableflies have piercing mouth parts; their food is blood. Therefore, they greatly annoy the cattle and attendants. Both houseflies and stableflies soil walls and equipment. These two kinds of flies look much alike. In addition to them, there are the small black horn flies, which are especially bothersome on account of their great numbers.

Flies breed in filth or decomposing matter of various kinds—houseflies in fresh manure from horses, cows, and calves, stableflies

¹¹ Additional information on this subject is given in Farmers' Bulletin 1596, Cattle Grubs or Heel Flies with Suggestions for Their Control.

¹² For further information, see Farmers' Bulletin 909, Cattle Lice and How to Eradicate Them.

¹³ More complete information on the suppression of flies may be obtained from the Bureau of Plant Entomology and Plant Quarantine, Department of Agriculture, Washington, D. C.

in wet and rotting straw or other vegetation, and horn flies in fresh cow droppings.

Cleaning up breeding places is one of the best ways of fighting all kinds of flies. Do not allow chaff and feed to accumulate in corners of stalls and mangers, especially in the stalls of calves receiving milk in any form. Early in the spring, remove straw stacks from the yards and straw that has been banked around water troughs and buildings. Do not allow droppings to accumulate in lanes and yards. If manure is piled in the open, haul it away at least once each week from early spring until winter. In the event that the manure is not hauled away frequently, the following plan of handling it may be used to prevent the breeding of flies. This plan has been in successful operation at St. Elizabeth's Hospital, Washington, D. C., for a number of years. It is based on the principle that the fly larvae in a manure pile pupate around the pile at its base. A trench containing larva-killing material entirely surrounds the pile. The larvae migrating to the outer edge of the pile fall into the trench and are killed. Although flies can travel considerable distances, the farmer can do much to lessen the number bred on his own farm, as most of them, under usual farm conditions, are bred there.

Another good way of getting rid of houseflies is to use properly baited traps (fig. 16). A good bait

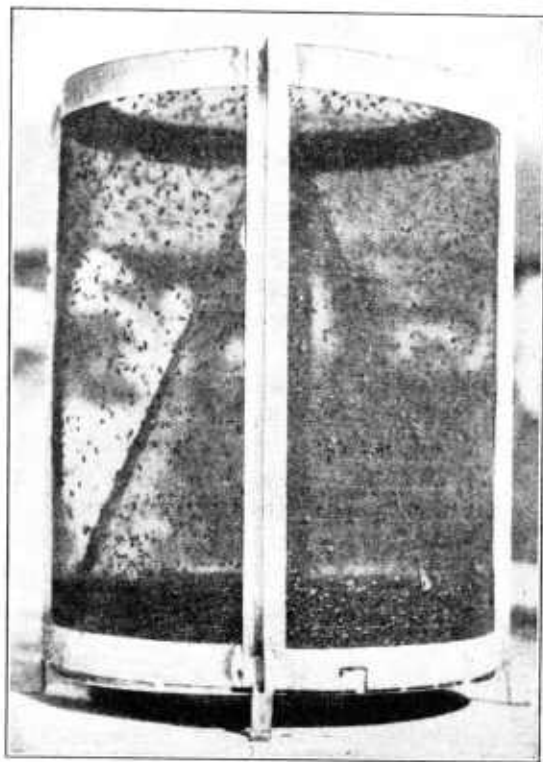


FIGURE 16.—A large flytrap of good design.

is made from 1 part sugarcane blackstrap molasses and 4 parts water. This bait should be renewed at least once a week. Other kinds of molasses, fruits, dried milk, and feed may be used but are not so good as the sugarcane blackstrap molasses and must be renewed more frequently. Traps should be placed where flies gather, preferably on the floor, in a spot free from strong currents of air, and where there is good light.

Stableflies and horn flies are not attracted by bait, but they may be killed by a spray. A cheap and effective killing fly spray may be prepared by suspending for 24 hours or longer a 5-pound bag of half-

closed pyrethrum flowers in 9 gallons of kerosene and 1 gallon of furnace fuel oil of 28° to 32° gravity. This mixture is applied with a pump equipped with a nozzle to deliver a very fine spray over a considerable area (fig. 17). Not all the flies hit will be killed immediately; some seen flying away will soon die from the effects of the spray. Large dairies find it practical to use a large power sprayer by means of which the barn can be filled with a fine mist when the flies have gathered. This sprayer, however, may be too expensive for use in small dairies. Flies may be sprayed while they are on the cattle, when they are on the walls, or at places where they have gathered for feed-

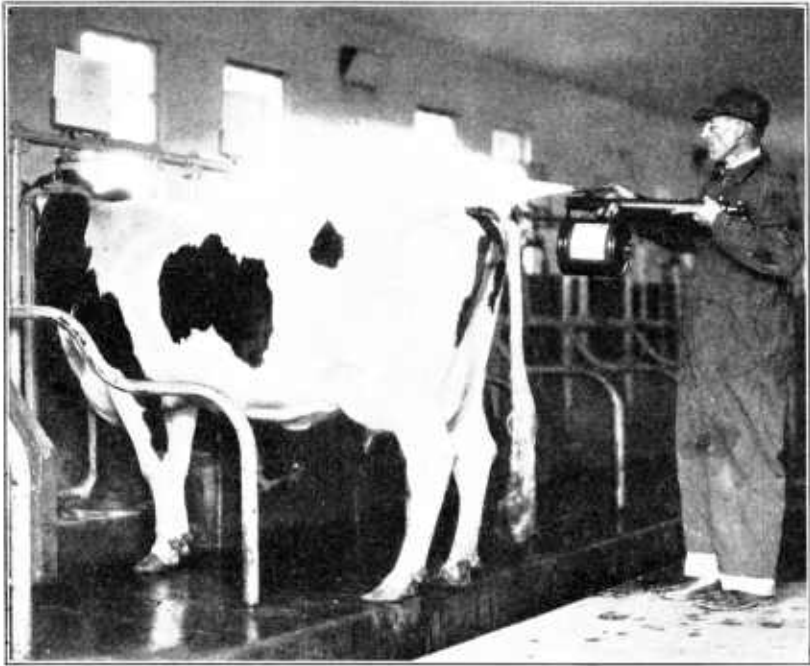


FIGURE 17.—A good type of spray pump.

ing. If they are sprayed while on the cattle, care should be taken that the spray is directed parallel with the animal and that the animals are not brushed immediately afterward, as the kerosene will blister the skin. Since horn flies stay on the cattle most of the time they are easily hit with the spray.

The pyrethrum flowers can be purchased from drug stores or wholesale druggists. A concentrated extract of pyrethrum flowers, which is ready for use when the kerosene and fuel oil are added, is also on the market. The extract is more convenient to use but is a little more expensive.

No repellent has yet been devised that will protect cows from flies for more than a few hours. The California Agricultural Experiment Station has found that some materials sprayed on the cows to repel the flies are more harmful than the flies. It is questionable whether it ever pays to spray cows merely to keep the flies off temporarily.

BAD HABITS ¹⁴

KICKING

Kicking during milking is due largely to poor management. Many heifers kick when they are being broken to milk and must be carefully handled so that they will not form the habit. Sore or cracked teats also cause cows to kick. Never strike a cow for kicking. Such practice will excite her and make her worse. Some animals must be restrained while being milked. This is best accomplished by placing a heavy strap around the rear legs just above the hocks. Pass the strap around one leg, cross between the legs, and then around the other, drawing them close together. Unless crossed in the middle, the strap will slip down when the cow struggles.

SUCKING

Every dairyman has had experience with cows that suck themselves. There seems to be no satisfactory explanation of why they do this. To prevent the habit, many devices and methods have been tried with varying degrees of success. One device may work successfully on one cow and fail on another.

A device that can be recommended is a bit made of $\frac{1}{2}$ -inch pipe through which several small holes have been drilled. The bit is equipped with rings like those in a horse's bit, and is attached to the cow's halter with snaps (fig. 18). When the cow tries to suck, air is admitted through the holes in the bit and prevents suction. The bit should be removed occasionally and the holes cleaned. If the cow's mouth gets sore, remove the bit while she is standing in the stanchion.

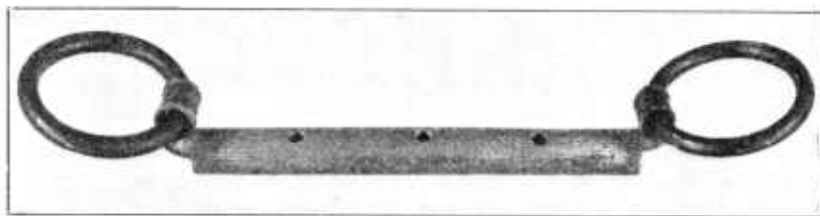


FIGURE 18.—This bit will prevent a cow from sucking herself or other cows.

DEHORNING

Horns are of no use to the dairy cow. She no longer needs to fight for self-protection or for the protection of her young. Cows with horns often injure one another in the stable or lot and sometimes accidentally injure attendants. Bulls with horns are decidedly more dangerous than those without. The only excuse for allowing animals to retain horns is appearance; it is very questionable, however, whether on most animals horns really improve the appearance. Still, horns do sometimes increase the selling price of an animal and may better its chances of winning in the show ring. As long as these conditions exist, there will be owners who will want the horns left on their registered animals.

¹⁴ Additional information on this subject is given in Farmers' Bulletin 1422, Udder Diseases of Dairy Cows.

In dehorning cattle or in preventing horn growth, the skin from which the horn grows should be removed or destroyed. In the young calf, this skin covers the horn button; later it lies at the base of the horn and surrounds it. When young calves are a few days to a week old, the growth of horns may be permanently arrested by rubbing the horn button with caustic soda or caustic potash until the outer skin is removed. This can be done most easily as soon as the horn button can be definitely located.

Older cattle are dehorned with a saw or clippers. The skin at the base of the horns should be removed with the horns. If any of this skin is left, the horns will grow again and produce what are known as scurs. Pine tar usually is applied after the horns are removed. This helps to keep away flies and probably assists in checking the bleeding. To avoid attacks by flies, it is best to dehorn late in the fall, during the winter, or early in the spring. Experiments indicate that the milk flow of dairy cows is not seriously affected by dehorning.